



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2021-1164; Project Identifier MCAI-2021-00975-E; Amendment 39-22019; AD 2022-08-16]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc) Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is superseding Airworthiness Directive (AD) 2020-20-07 for certain Rolls-Royce Deutschland Ltd & Co KG (RRD) Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, Trent 1000-R3, Trent 7000-72, and Trent 7000-72C model turbofan engines. AD 2020-20-07 required initial and repetitive borescope inspections (BSIs) or visual inspections of the intermediate-pressure compressor (IPC) shaft assembly and, depending on the results of the inspection, replacement of the IPC shaft assembly. This AD was prompted by the manufacturer providing optional terminating actions for the required repetitive inspections and alternative inspection instructions. This AD continues to require initial and repetitive BSIs but allows modification of the engine in accordance with RRD service information as a terminating action to these inspections, as specified in a European Union Aviation Safety Agency (EASA) AD, which is incorporated by reference. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: For material incorporated by reference in this AD, contact EASA, Konrad-Adenauer-Ufer 3, 50668 Cologne, Germany; phone: +49 221 8999 000; email: ADs@easa.europa.eu. You may find this material on the EASA website at <https://ad.easa.europa.eu>. You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-1164.

Examining the AD Docket

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-1164; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the EASA AD, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Nicholas Paine, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7116; email: nicholas.j.paine@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

EASA, which is the Technical Agent for the Member States of the European Union, has issued EASA AD 2019-0282R1, dated August 25, 2021 (EASA AD 2019-0282R1), to address an unsafe condition for all RRD Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, Trent 1000-R3, Trent 7000-72, and Trent 7000-72C model turbofan engines. The EASA AD includes exceptions that limit the applicability for certain engines.

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2020-20-07, Amendment 39-21263 (85 FR 62975, October 6, 2020),

(AD 2020-20-07). AD 2020-20-07 applied to all RRD Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, Trent 1000-R3, Trent 7000-72, and Trent 7000-72C model turbofan engines. The NPRM published in the *Federal Register* on December 28, 2021 (86 FR 73690). The NPRM was prompted by a report of crack findings in the front air seal on the IPC shaft assembly during the stripping of a flight test engine. The NPRM was also prompted by the manufacturer's publication of service information that provides optional terminating actions for the required repetitive inspections and alternative inspection instructions. In the NPRM, the FAA proposed to continue to require initial and repetitive BSIs of the IPC shaft assembly. In the NPRM, the FAA also proposed to require compliance with the required actions from November 10, 2020, the effective date of AD 2020-20-07. In the NPRM, the FAA also proposed to allow modification of the engine in accordance with Rolls-Royce service information as a terminating action to the initial and repetitive BSIs of the IPC shaft assembly. In the NPRM, the FAA also proposed to require accomplishing the actions specified in EASA AD 2019-0282R1, described previously, as incorporated by reference, except for any differences identified as exceptions in the regulatory text of this AD. The FAA is issuing this AD to address the unsafe condition on these products. See EASA AD 2019-0282R1 for additional background information.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from two commenters. The commenters were Delta Air Lines, Inc. (DAL), and The Boeing Company (Boeing). The following presents the comments received on the NPRM and the FAA's response to each comment.

Request to Reevaluate the Need for this FAA AD

DAL requested that the FAA reevaluate the need for the proposed AD. DAL noted that after EASA revised EASA AD 2019-0282, RRD requested, and the FAA granted, a global Alternative Methods of Compliance (AMOC) that includes the changes in EASA AD 2019-0282R1. DAL reasoned that the regulatory requirements in the proposed NPRM are captured by AD 2020-20-07 and the global AMOC.

The FAA disagrees with withdrawing the NPRM. Issuing this AD addresses the unsafe condition, incorporates an optional terminating action, and incorporates by reference the required actions and compliance times specified in EASA AD 2019-0282R1. The FAA did not change the AD as a result of this comment.

Request to Recognize AMOCs Approved for AD 2020-20-07

DAL requested that the FAA update paragraph (i) of this AD to recognize AMOCs previously approved under AD 2020-20-07. DAL received an FAA-approved AMOC to AD 2020-20-07 for deviations in the on-wing inspection procedure, material, and tooling as specified in Rolls-Royce Trent 1000 Alert NMSB 72-AK451, Initial Issue, dated November 14, 2019. DAL used this AMOC to comply with AD 2020-20-07 and will need to continue to use the provisions in this AMOC to comply with this AD. DAL reasoned that since the AD retains all the requirements of AD 2020-20-07, AMOCs granted for AD 2020-20-07 should also be applicable to this AD.

The FAA agrees and has revised paragraph (i) of this AD to include that AMOCs approved previously for AD 2020-20-07 are approved as AMOCs for the corresponding provisions of this AD.

Support for the AD

Boeing expressed support for the AD as written.

Conclusion

The FAA reviewed the relevant data, considered the comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes, and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information under 1 CFR Part 51

The FAA reviewed EASA AD 2019-0282R1. EASA AD 2019-0282R1 describes actions for initial and repetitive BSIs of the IPC shaft assembly. This material is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

Other Related Service Information

The FAA reviewed Rolls-Royce Trent 1000 Alert Non-Modification Service Bulletin (NMSB) 72-AK451, Revision 1, dated July 15, 2021 (Rolls-Royce Trent 1000 Alert NMSB 72-AK451); Rolls-Royce Trent 1000 SB 72-K570; and Rolls-Royce Trent 1000 SB 72-K571.

Rolls-Royce Trent 1000 Alert NMSB 72-AK451 describes procedures for initial and repetitive BSIs of the IPC shaft assembly. Rolls-Royce Trent 1000 SB 72-K570 and Rolls-Royce Trent 1000 SB 72-K571, differentiated by engine model, describe procedures for the modification of the engine as a terminating action to the initial and repetitive BSIs of the IPC shaft assembly.

Costs of Compliance

The FAA estimates that this AD affects 22 engines installed on airplanes of U.S. Registry.

The FAA estimates the following costs to comply with this AD:

Estimated costs				
Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
BSI or visual inspection of IPC shaft assembly	3.5 work-hours x \$85 per hour = \$297.50	\$0	\$297.50	\$6,545

The FAA estimates the following costs to do any necessary replacement that is required based on the results of the inspection. The agency has no way of determining the number of aircraft that might need this replacement:

On-condition costs			
Action	Labor Cost	Parts Cost	Cost per product
Replace IPC shaft assembly	1,080 work-hours x \$85 per hour = \$91,800	\$1,365,219	\$1,457,019

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

- 2. The FAA amends § 39.13 by:

- a. Removing Airworthiness Directive 2020-20-07, Amendment 39-21263 (85 FR 62975, October 6, 2020); and
- b. Adding the following new airworthiness directive:

2022-08-16 Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc): Amendment 39-22019; Docket No. FAA-2021-1164; Project Identifier MCAI-2021-00975-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

This AD replaces AD 2020-20-07, Amendment 39-21263 (85 FR 62975, October 6, 2020) (AD 2020-20-07).

(c) Applicability

This AD applies to Rolls-Royce Deutschland Ltd & Co KG (RRD) Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, Trent 1000-R3, Trent 7000-72, and Trent 7000-72C model turbofan engines installed as identified in European Union Aviation Safety Agency (EASA) AD 2019-0282R1, dated August 25, 2021 (EASA AD 2019-0282R1).

(d) Subject

Joint Aircraft Service Component (JASC) Code 7230, Turbine Engine Compressor Section.

(e) Unsafe Condition

This AD was prompted by a report of crack findings in the front air seal on the intermediate-pressure compressor (IPC) shaft assembly during the stripping of a flight test engine. The FAA is issuing this AD to prevent failure of the IPC shaft assembly. The unsafe condition, if not addressed, could result in loss of thrust control and reduced control of the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

Except as specified in paragraph (h) of this AD: Perform all required actions within the compliance times specified in, and in accordance with, EASA AD 2019-0282R1.

(h) Exceptions to EASA AD 2019-0282R1

(1) Where EASA AD 2019-0282R1 requires compliance from November 27, 2019, the effective date of EASA AD 2019-0282, this AD requires compliance from November 10, 2020, the effective date of FAA AD 2020-20-07.

(2) Where EASA AD 2019-0282R1 requires contacting Rolls-Royce for approved corrective actions if a crack is detected during any on-wing inspection and in-shop inspection, this AD requires removing the IPC shaft assembly and replacing it with a part eligible for installation before further flight.

(3) Where EASA AD 2019-0282R1 defines a serviceable part as an IPC shaft assembly which is not an affected part; or an affected part which is new (never previously installed on an engine); or an affected part that, before (re)installation, has passed (no crack detected) an inspection in accordance with the instructions of the NMSB, this AD also includes in that definition an IPC shaft assembly that, before (re)installation, has passed a visual inspection (no crack detected) of the exposed part using FAA-approved maintenance procedures.

(4) Where EASA AD 2019-0282R1 references on-wing inspections, this AD allows for a visual inspection of the IPC shaft assembly using FAA-approved maintenance procedures as a substitute for any on-wing borescope inspection if the affected part is exposed, provided that the compliance times specified in this AD are not exceeded.

(5) This AD does not mandate compliance with the “Remarks” section of EASA AD 2019-0282R1.

(i) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards

District Office, as appropriate. If sending information directly to the manager of the ECO Branch, send it to the attention of the person identified in paragraph (j)(1) of this AD. Information may be emailed to: ANE-AD-AMOC @faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(3) AMOCs approved previously for AD 2020-20-07 are approved as AMOCs for the corresponding provisions of this AD.

(j) Related Information

(1) For more information about this AD, contact Nicholas Paine, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7116; email: nicholas.j.paine@faa.gov.

(2) For service information identified in this AD that is not incorporated by reference, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: +44 (0)1332 242424 fax: +44 (0)1332 249936; website: <https://www.rolls-royce.com/contact-us.aspx>. You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(k) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless this AD specifies otherwise.

(i) European Union Aviation Safety Agency (EASA) AD 2019-0282R1, dated August 25, 2021.

(ii) [Reserved]

(3) For more information about EASA AD 2019-0282R1, contact EASA, Konrad-Adenauer-Ufer 3, 50668 Cologne, Germany; phone: +49 221 8999 000; email:

ADs@easa.europa.eu. You may find this material on the EASA website at <https://ad.easa.europa.eu>.

(4) You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110. This material may be found in the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-1164.

(5) You may view this material that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email fr.inspection@nara.gov, or go to <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on April 8, 2022.

Lance T. Gant, Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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